Terms of Reference

Quick Look Study:
Human-System Integration in Air Force Weapon Systems Development and Acquisition

Background

The Air Force has historically recognized the critical contribution of human effectiveness in the performance of its weapon systems. This recognition is reflected in the high standards maintained for training, skill competency, proficiency and readiness of Air Force warfighters. With the rapidly expanding sophistication of modern weapon systems and the ever-increasing demands for rapid and accurate response to dynamic mission environments, the capability of humans to cope with information processing demands has become a limiting factor on overall system performance. At the same time, the proliferation of highly automated and semi-autonomous systems is introducing fundamental, qualitative changes in the role of humans and task demands imposed on operators across a broad range of USAF missions. In view of the pervasive and unprecedented nature of these changes, it is both prudent and timely for the Air Force to re-examine the institutions, processes, and practices to assure effective human-system integration (HSI).

Senior Air Force leaders have expressed concern regarding the level of awareness of HSI and the adequacy of current institutions and practices to deal with the challenges just cited above. In a May 2000 memorandum, Lt. Gen. Stephen Plummer, then Principal Deputy to the Undersecretary for Acquisition, strongly encouraged the leaders of the Air Force research, development, acquisition, and testing communities to strengthen awareness of HSI and to take steps to assure that Air Force systems are optimized for safety and utility through a disciplined application of human engineering principles (Ref. 1). At the request of the Air Force Surgeon General (with approval of CSAF), the SAB will undertake a study to identify and recommend specific measures to assure effective HSI across the full range of Air Force systems and platforms. The study will identify any key shortfalls in the application of HSI principles, and will make specific recommendations to assist in defining an Air Force Instruction (AFI) that will help institutionalize HSI as an integral element of weapons system development and acquisition.

Objective and Scope

The primary objective of the study is to assess current Air Force practices for human-system integration and identify opportunities to strengthen the quality, uniformity, timeliness, and cost-effectiveness of HSI as an integral part of the development and acquisition process. The study will address the general level of HSI awareness and impact on operational utility and safety, as well as the specific policies, procedures, standards, and engineering practices that enable successful application of human-centered design principles in weapons system design, development, testing and procurement. The scope of the study will encompass the full range of Air Force missions and system applications in which human decision making and performance are critical to mission success (including air combat, air mobility, C4/ISR, information warfare, and space operations).

Approach

A special study team will be established to accomplish the stated objectives, within the charter of the existing SAB Advisory Group to the 311th Human Systems Wing. The membership of this advisory group will be augmented, on a temporary basis, to strengthen expertise in several key domains including Air Force acquisition practices, requirements generation/validation, system engineering processes, and warfighter training systems. The study team will review current Air Force institutions including applicable regulations, procedures and standards to establish a benchmark for the study. The team will make site visits to selected Air Force facilities and program offices to gain further insight into current practices and

their implementation within the larger weapon system acquisition context. The team will also seek to obtain lessons-learned and representative case studies from experienced practitioners to assist in identifying best practices and/or gaps in the present Air Force approach to HSI. Subject matter experts from government, industry and academia will be interviewed to help ascertain the strengths and weaknesses of current technologies, methods, tools, procedures and facilities. Present HSI policies and practices of the other services will also be actively examined in an effort to assess applicability of alternative approaches to incorporating HSI into the Air Force development and acquisition process. The team will report its findings and recommendations in the form of a summary briefing and written report to the Air Force Surgeon General and cognizant leaders at Air Force Materiel Command.

Study Team Membership

Proposed membership for a "core" study team is as follows:

Candidate Team Members	Organization	Subject Matter Domain Expertise
Mr. Jeff Erickson (Chair)	Boeing Phantom Works	HSI Contractor / Systems Engineering
Dr. Greg Zacharias (Co-Chair)	Charles River Analytics	HSI Research and Development
M Gen (R) George Harrison	GA Tech Research Center	USAF Operations / Test & Evaluation
M Gen (R) Eric Nelson	Private Consultant	USAF System Devel & Acquisition
Dr. Dexter Fletcher	Institute for Defense Analysis	Training Systems & Technology
M Gen (R) Bob Rankine	Private Consultant	USAF R&D / Technology Transition

This core team will be augmented on an "as needed" basis by other members of the SAB Advisory Group to the 311th Human Systems Wing.

Study Schedule

30 Nov 03: Prepare and submit study plan to SAB leadership
15 Jan 04: Study Kickoff Meeting
Dec 03 - Jan 04: Review of applicable HSI requirements, regulations, standards & procedures
Feb 04 - May 04: Site visits and SME Interviews
19 - 21 Apr 04: Interim working meeting (part of HSWAG Spring Meeting)
28 Jun 04 - 2 Jul 04: Final briefing preparation & outbrief (2nd week of SAB Summer Session)
Aug 04: Final report draft
Final briefings to AF/CC, AF/SG, AFMC/CC, others TBD

Potential Site Visits

Wright-Patterson AFB: AFRL/HE/IF/VA, AFMC Headquarters, Aeronautical Systems Center, SPOs TBD
Hanscom AFB: Electronic Systems Center
Los Angeles AFB: Space & Missile Systems Center, Space Systems SPO (TBD)
Brooks City Base: 311th Human Systems Wing, AFRL/HE
Rome Research Site: AFRL/IF
US Army MANPRINT Program Office
Huntsville: US Army Systems Integration Lab
Ft. Rucker: US Army Rotorcraft SPO (TBD)
USN NAVSEA, SPAWAR, DD-X Program Office (?)

Potential SME Interviews

LGen (R) Stephen Plummer (former Deputy, Assistant Secretary for Acquisition, SAF/AQ)
LGen (R) George Muellner, VP, Air Force Systems, Boeing (former Deputy, Assistant Sec SAF/AQ)
Mr. Hal Booher (Former US Army MANPRINT Program Manager)
Dr. Thad Sandford, VP Engineering, Boeing Integrated Defense Systems (former Director AFFDL)
MGen (R) Dick Paul, VP Strategic Development, Boeing Phantom Works (Former CC AFRL)
Mr. James Brinkley (former Director, Human Effectiveness, AFRL)
Dr. Valerie Gawron, Senior Human Factors Specialist, Veridian Engineering (Former SAB Member)

References

Memorandum: Awareness of Human-Systems Integration (HSI) in Air Force Acquisitions. Stephen B. Plummer, Lt. General, USAF; Principal Deputy, Assistant Secretary of the Air Force (Acquisition); June 2000